

shining epidermis. The fasciculated leaves are very small, somewhat glutinously rugulose, 1 or 2 lines long, scarcely $\frac{1}{4}$ line broad; the terminal inflorescence has its spicated branchlets 6 lines long; the calyx is broadly tubular, 1 line long, cano-pubescent outside, divided halfway into five triangular teeth; the tube of the corolla is a trifle longer than the calyx, cylindrical and pilose outside; the pistil is as long as the tube of the corolla; the ovary semiglobose, seated upon the disk; the stigma, annular at base, is rather longer than the style, conical, and divided at its apex into two short obtuse segments. The glabrous fruit consists of two nucules, each 2-celled.

[To be continued.]

XII.—On *Phidiana lynceus* and *Ismaila monstrosa*.

By Dr. RUD. BERGH*.

[Plate I.]

THE genus *Phidiana*, Gray, may be thus characterized:—

PHIDIANA, Gray.

Corpus gracilius, elongatum. Rhinophoria perfoliata; tentacula elongata. Papillæ dorsales in series obliquas confertas dispositæ. Podarium antice rotundatum vel subtruncatum.

Margo masticatorius mandibulæ singula serie denticulorum præditus. Radula paucidentata, dentibus uniseriatis armata.

This genus agrees, with regard to the structure of the rhinophoria, with the more remote genus *Antiopa*, as well as with *Flabellina*, Cuv., from which latter, however, it is easily distinguished by the bases of the papillæ and by the produced anterior corners of the foot in *Flabellina*; but the statements of Dr. Gray and Messrs. Alder and Hancock, as to the occurrence of lateral teeth in the latter genus, were not borne out by a more recent examination of this point in a new species, *Fl. Semperi*, Bgh. *Facelina*, Ald. & Hanc., is also easily distinguished by the produced corners of the foot. *Spurilla*, Bgh. (see the 'Transactions of the Royal Danish Society of Sciences,' vii. 1864, p. 205), forms an intervening link between *Phidiana* and the more typical *Æolididæ*, particularly *Æolidiella*, a new genus, comprising as yet four species (viz. *Æ. Sæmmeringii*, F. S. Leuckart, *Æ. occidentalis*, Bgh., n. sp., *Æ. glauca*, A. & H., *Æ. Alderi*, Cocks), and which may be thus characterized:—

ÆOLIDIELLA, Bgh.

Forma corporis, rhinophoria, tentacula, papillæ et podarium ut in *Æolidiis* sensu strictiore.

* Extract from 'Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjöbenhavn' f. 1866.

Margo masticatorius mandibulæ minutissime longitudinaliter plicatus. Dentes radulæ uniseriati. Dentes pectiniformes, medio emarginati.

Only four species can with certainty be classed under *Phidiana*, viz. *Ph. inca* (d'Orb.), *Ph. patagonica*, d'Orb., *Ph. unilineata*, A. & H., *Ph. lynceus*, Bgh., n. sp. Perhaps *Æ. Allderiana*, Desh. (Frédol?, 'Le Monde de la Mer,' 1864, p. xi, f. 7) and *Æ. northumbrica*, Ald. & Hanc., also belong to *Phidiana*. An anatomical examination of *Ph. lynceus*, Bgh., affords several interesting results, particularly with regard to the organs of vision. The eye was observed in the middle of the external margin of the cerebro-visceral ganglion. Immediately behind the eye, and a little further in, another, smaller, shortly pedunculate globular body was observed, which proved to be an accessory eye; the diameter was 0·05 to 0·06 millim., the pigment black, the lens small, colourless, with a small yellowish kind of nucleus. Close behind the accessory eye a vesicle, sparingly filled with cells and nuclei, with thin walls, was seen to protrude from the surface of the ganglion. This vesicle might be the auricular vesicle; no other organ that could be so interpreted was found. Whilst plurality is a frequent phenomenon amongst Acephala and Tunicata, no instance of the normal occurrence of more than one pair of eyes was hitherto recorded in the class of Gasteropoda. The earlier statements concerning the occurrence of such an arrangement in the genus *Diplommatina* (Bens.) turned out to be founded on a misconception*. Nor was Claparède able to find the black spot which Moquin-Tandon stated he saw in *Neritina fluviatilis* behind the true eye, and which he described as being like an accessory eye†. Agassiz states, in his 'Lectures on Comparative Embryology,' 1849, p. 86, that on a little *Margarita* from the roadstead of Boston, he had seen a row of eyes placed at the base of the tentacles of the epipodial fringe. But this statement is not borne out by the results of a careful examination of *M. grönländica* and *M. cinerea*. When viewed from beneath, the tentacles of the epipodial fringe in *M. grönländica*, Ch., are seen to issue each from a small depression, of which the inner margin is almost always swollen in the middle, and contains a varying quantity of black pigment; sometimes this pigment is disposed in the shape of a ring, and in that case these tubercles assume a striking similarity to eyes. These tubercles resembling eyes are of very different shapes, sometimes rather oval; in some cases the pigment is continued along the lateral

* Comp. A. Adams in 'Ann. & Mag. N. Hist.' ser. 2. vi. 1860, p. 113, and *ibid.* xii. 1863, pl. vii. figs. 11, 12.

† Comp. Claparède in Müller's 'Archiv,' 1857, p. 139, and Moquin-Tandon in 'Hist. Nat. des mollusq. fluv. et terr. de la France,' ii. p. 522.

margin of the depression in which the tentacle stands, and even further, so as to form a narrow black border along the lobe between two succeeding tentacles; in these cases the underside of the base of the tentacle is occasionally also coloured. In some individuals no pigment was observable, and the tubercles were then generally but little developed. These latter are of a firm consistency; and their colour is due to peculiar cells, which stand perpendicular on the surface, and much resemble those observed in the eyes of various mollusca. No ganglion could be found in the base of the tubercles; and therefore the tubercles in question cannot even be regarded as merely photoscopic eyes, much less as corresponding in structure with the real eye of these animals. Something similar, but in smaller degree, was observed in *M. cinerea*, Couth. (var. *grandis*). The real eye in *Margarita* was seen as a black spot shining through the apex of the ophthalmophorium; and on this spot a small oval opening was observed, of varying size, and which could be distended by pressure. No lens, nor apparently any vitreous humour existed. A similar opening seems to exist on the eye of *Fissurella rosea* (Lam.). If these observations are confirmed, the eye will in these animals exhibit the same remarkable structure, without dioptric apparatus, which has been found in *Nautilus*. To return to *Phidiana lynceus*, it may be observed that a doubling of the eye on one or both sides has certainly been observed as a monstrosity in many Gasteropoda; but the occurrence of accessory eyes in the *Phidiana* was certainly no monstrosity, for the three individuals examined agreed perfectly in this respect. Nor could these organs be interpreted in any other way than as eyes. There exist, no doubt, *Æolididæ* in which the ear remains in its embryonal stage, with one otolith; but, excepting a few Pteropoda, there exists scarcely any Gasteropod in which the ear exhibits such a development of pigment as is seen in the organs referred to in *Phidiana lynceus*.

The band or tube connecting the sacs which contain the urticating cells with the lobes of the liver was unusually long in this species, rolled up in a coil generally placed on one side of the lobe. Both cysts and free urticating cells were seen dispersed through the whole length of the tube. Dr. Bergh does not agree with the theory advocated by Prof. Huxley, Dr. Gosse, and Mr. Strethill Wright, that the urticating cells in *Æolididæ* are a kind of fæcal excretions, and derived from the animals on which they live; for sacs containing urticating cells are wanting in many genera, as *Embletonia*, *Fiona*, *Phyllodesmium*, in *Hermacinæ* and *Proctonotinæ*, though these, or at any rate most of them, certainly feed upon animals which

possess urticating cells. Besides it is easy to show that in several *Æolididæ* (for instance, species of *Glaucus*, which live almost exclusively on one kind of food, *Vellella* and *Porpita*) the urticating threads found in the digestive tube and derived from the food are quite different from those found in the urticating cells and secreted by the animals themselves. Nor does that theory agree with the fact that the urticating cells are to a great extent not free in the sacs, but enclosed in cysts, and become free only by the bursting of the latter. Dr. Bergh refers finally to the great analogy in anatomical respects between *Æolididæ* and *Pleurophyllididæ*, and concludes that the urticating cells in the sacs are the product of the *Æolididæ* themselves, and not derived from their food.

On the back of one of the specimens of *Phidiana lynceus*, immediately behind the second group of papillæ, a deep depression was observed, as if some body had been located there but had fallen off; in the middle of this depression an irregular round opening of 0.25 millim. diameter was seen. The sexual gland was very much atrophied, only the foremost and hindmost lobes being well developed. In the second specimen a round opening, 0.75 millim. broad, was observed in exactly the same place as in the first specimen, and a pointed prominence was seen in the opening; another, much smaller opening was seen in front of the one described. On the sides of the animal several yellowish slanting bodies seemed to shine through the integuments from inside. When the inner cavity was examined the greater part of the space usually filled by the sexual gland was occupied by a parasite, the gland being atrophied as in the first individual. The parasite was a Copepodous crustacean, with the back downwards, the head forwards, and the posterior extremity reaching out into the larger opening before described. This crustacean reminded one of the *Splanchnotrophus brevipes* of Hancock and Norman, but differs from this in several important points, viz. the well-developed large cephalothorax, the articulated abdomen, the absence of true limbs, the peculiar arm-like lateral prolongations of the body, the dorsal prolongation, and the remarkable prolongation of the abdomen (which forms a kind of tail).

The only specimen was a female: no males could be discovered; and Dr. Bergh recalls with good reason Professor Krøyer's remark, in his last contribution to the history of parasitic Entomostraca (*Naturhistorisk Tidsskrift*, ser. 3. ii. 1863, p. 396), that "whenever the incompleteness of our knowledge compels us to found genera on females only, or to group species of which only the female is known together with others

of which both sexes are known, it must always be carefully borne in mind that such arrangements are only provisional, and can only be definitely settled when the males shall have been examined." Nevertheless he ventures, with all due reservation, to give a generic character of the new parasite found in the *Phidiana*, and which he calls *Ismaila*.

ISMAILA, Bgh., n. g.

Fœmina.—Cephalothorax distinctus. Duo antennarum paria; antennæ priores minutæ; posteriores paullo majores, prensoria. Abdomen supra in tria segmenta divisum, ultimum in appendicem erectam productum; segmenta omnia utroque latere in brachium elongata; duo priora segmenta inferiore pagina, pedum abdominalium loco, duobus paribus brachiorum inter sese similium prædita. Cauda elongata, apice solum articulata, ultimo segmento appendicibus caudalibus brevissimis setigeris.

Mas ignotus.

The mouth was furnished with a very powerful pair of mandibles. The species is called *Ism. monstrosa*, n. sp.

Dr. Bergh has observed the *Spl. brevipes*, Hanc. & Norman (♀), in a new species of *Galvina* from the Kattegat, *G. viridula*, Bgh.; a specimen of *G. rupium* yielded another parasite, namely an oceanic Acaride, of which some very few have been observed before. Having on a former occasion given a less accurate description of the rasp in *Galvina rupium*, the author now supplies the deficiency by an accurate drawing showing a peculiar depressed position of the apex, which is not seen from above, and therefore not observable in the figures given by Hancock (Monogr., suppl. pl. 47. figs. 25–27), but which seems to be found in all species of *Galvina*.

EXPLANATION OF PLATE I.

- Fig. 1.* The rasp of *Phidiana inca*, D'Orb., from the side.
Fig. 2. A dental plate of the same, from underneath.
Fig. 3. A part of the rasp of *Phidiana lynceus*, Bgh., from the side.
Fig. 4. A dental plate of the same from above obliquely.
Fig. 5. The apex of a rhinophore of the same.
Fig. 6. The middle dental plates of *Galvina rupium*, Möll., from the side.
Fig. 7. The same, from above.
Fig. 8. The central part of the nervous system of *Phidiana lynceus*:
a, ganglion olfactorium; *b*, gangl. cerebroviscerale; *c*, gangl. pedicæum; *d*, gangl. buccinatorium; α , commissura pedicæa; β , comm. visceralis (branchialis); γ , commissura buccalis; δ , comm. sympathica.
Fig. 9. The larger eye of *Phidiana lynceus*.
Fig. 10. The smaller eye of the same.
Fig. 11. The epipodial margin of *Margarita grønlandica*, Ch., with the round bodies resembling eyes.
Figs. 12 & 13. Small bodies resembling eyes.

Figs. 14, 15, 16. Cells from the surface of the latter.

Fig. 17. Cells from the stratum containing the pigment of the true eye.

Fig. 18. The true eye of *Margarita grönlandica*, from the side.

Fig. 19. The same, from the front.

Figs. 20, 21, 22. *Ismaila monstrosa*, in different positions.

XIII.—On *Spirifer cuspidatus*.

To the Editors of the Annals and Magazine of Natural History.

University of London.

July 20, 1868.

GENTLEMEN,

I have no intention of discussing with Prof. King the validity of the generic distinction which has been affirmed to exist between *Syringothyris* and *Spirifer*, since this distinction was not laid down by myself, and the main question involved in it lies beyond the scope of my own researches. But, for the sake of those who are associated with me in this matter, I feel it necessary to make a few remarks upon that portion of his argument which relates to the microscopic structure of the shell in these two types respectively.

Prof. King, having been allowed, by the kindness of Mr. Davidson, the fullest opportunity of examining the singularly well-preserved specimen of *Spirifer cuspidatus*, of which I described the structure in my last communication on this subject, and having found himself equally unable with myself to discern in it any trace of those perforations which he has so persistently asserted to exist in that type, supplies the deficiency out of the depths of his own inner consciousness. "Impressed," he tells us, "with the preceding evidences and considerations, I can only conclude that, wherever imperforate spaces occur in *Spirifer cuspidatus*, perforations were originally present in them. And although Mr. Davidson's specimen (also, it must be remembered, Prof. Harkness's) may be noted as 'exhibiting not the smallest trace of perforations,' I have no hesitation whatever in adopting the same simple conclusion in this case as well, rather than seek for its explanation in any strange morphological doctrine."

What "strange morphological doctrine" is involved in the assertion that the true *Spirifer cuspidatus* belongs to that "imperforate" type which I showed to exist among Brachiopods, at the very time when I first demonstrated* that the "punctations" by which the true Terebratulidæ and certain Spiriferidæ are characterized are the orifices of "perforations," I must own

* Reports of the British Association for 1844.